



**Qatargas, Rasgas, Dolphin:**  
**among the largest gas projects in the world**

Sitting on 6% of the world's natural gas reserves, Qatar is considered to be one of the five countries in the world with the biggest natural gas reserves, concentrated in the North Gas Field, the largest single non-associated field in the world.

In view of the large reserves Qatar Petroleum (QP) has worked out a phased strategic plan to develop the field and optimize the exploitation of its resources with the aim to realize additional financial returns by exporting gas both as liquefied (LNG) by tanker and natural gas by pipelines.

The major gas projects are:

- Qatar Liquefied Natural Gas Project (Qatargas)
- Ras Laffan Liquefied Natural Gas Project (RasGas)
- Dolphin Project



**Unidro SpA is the sole Water Treatment Supplier participating to all the above projects,** having water treatment systems installed or under installation within all the main projects facilities.

The presence of Unidro in these projects is a confirmation of the main role Unidro is having in some of the world's major presently ongoing Gas Projects (Agip-Libya, Shell-Sakhalin) as a result of the front-ending technologies Unidro can propose and of the high quality of its engineering work, which is recognised by the most demanding Oil Companies and EPC contractors.



## Qatar Liquefied Natural Gas Project (Qatargas)

Qatargas was the first of Qatar's LNG projects to be implemented. Qatar Liquefied Gas Company Ltd (Qatargas), Qatar's first and major LNG Company, was established in 1984 to own and operate onshore LNG plants utilising natural gas from the North Field and to market and export LNG worldwide.



### The Qatargas existing facilities (LNG Trains 1, 2, 3)

The Qatargas three existing trains are currently producing over 8 million tons per annum of LNG, exported to Japan and then and USA .

The trains have been originally designed and built in the nineties by Chiyoda, and they have been later debottlenecked under a contract awarded to the Technip/Chiyoda joint venture.



### The Qatargas II project (LNG Trains 4, 5)

EPC contractor for trains 4 and 5, the world's two largest LNG trains, is CTJV (Chiyoda Corporation of Japan and Technip of France Joint Venture).

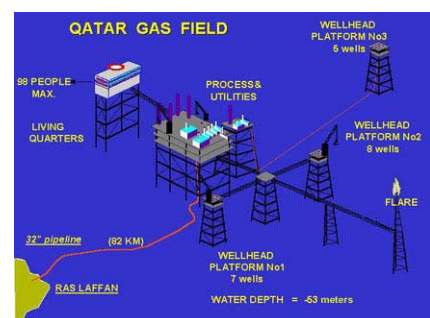
The plant will be installed in the existing Qatargas plot and will benefit from the existing infrastructure. Each train will produce an expected minimum of 7.8 million tons per annum of LNG, with Train 4 scheduled for start up in late 2007, and Train 5 approximately 9 months later.



### The Qatargas III and Qatargas IV Projects (LNG Trains 6 and 7)

Qatargas III, (shareholders Qatar Petroleum and ConocoPhillips) and Qatargas IV (shareholders Qatar Petroleum and Royal Dutch Shell) contracted two additional large-scale LNG Trains, respectively n°6 and 7, to the Chiyoda Corporation and Technip France Joint Venture (CTJV).

The two new LNG projects (capacity 7.8 million tonnes-per-annum each) will be also located at Ras Laffan Industrial City, in the same area of the preceding Qatargas projects.



In order to capture substantial synergies, Qatargas 3 and Qatargas 4 are executing the development of the onshore and offshore assets as a single integrated project.

## Unidro's role in the Qatargas projects

### Qatargas II

In July 2005 Unidro was awarded from CTJV the supply of two Water Treatment Units, common to both LNG trains 4 and 5 (Qatargas II).

Condensate Polishing Unit includes 3x50% Mixed Beds polishers, capacity 900 m<sup>3</sup>/h with regeneration and neutralisation facilities and n<sup>o</sup>2 suspect condensate recovery units, each including 2 Activated Carbon Filters designed for 115 m<sup>3</sup>/h.

Remineralisation unit includes 2x100% limestone filters, capacity 6 m<sup>3</sup>/h and the related carbon dioxide dosing equipment.

Delivery schedule for both units is Q2 2006.

### Qatargas III

As successful supplier of the Condensate Polishing and Remineralisation Units for Qatargas II project, in 2006 Unidro has been awarded two additional contracts to supply similar units for the LNG trains 6 and 7 (Qatargas III).

Condensate Polishing Unit includes 4x33% Mixed Beds polishers, capacity 1350m<sup>3</sup>/h with regeneration and neutralisation facilities and n<sup>o</sup>2 suspect condensate recovery units, each including 2 Activated Carbon Filters designed for 115 m<sup>3</sup>/h.

Remineralisation unit includes two limestone filters, capacity 6 m<sup>3</sup>/h and the related carbon dioxide dosing equipment and it is a copy of the unit supplied for QGII

Delivery schedule for both units is Q2 2007.

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## Ras Laffan Liquefied Natural Gas Project (Rasgas)

Rasgas is Qatar's second LNG project. The Ras Laffan Liquefied Gas Company (Rasgas) was established in 1993, the two major shareholders in the project are **Qatar Petroleum** and **ExxonMobil**.



### Existing production (Trains 1, 2)

Two onshore LNG trains have been constructed with the capacity to manufacture 6.6 MMTA of LNG per year, together with 45,000 barrels per day of condensate and 300 tonnes per day of solid sulphur. The first train was completed in early 1999, and loaded its first cargo in August 1999 for South Korea's Kogas, which has a long-term supply contract. The second train came onstream in April 2000.



### The RasGas II project (LNG Trains 3, 4 and 5)

LNG Trains 3,4 have CMS&A (Chiyoda-Snamprogetti JV) as the **EPC contractor** for the onshore component.



Train 3's output of 4.7 mmtpa is earmarked solely for India's Petronet (start-up early 2004), Train 4, identical to Train 3 and with the same output, caters to requirements of Edison of Italy (start up in the autumn of 2005). Coupled with existing production from Trains 1 and 2, upon completion of the Expansion Project (Trains 3 & 4) the total RasGas LNG production capacity reaches 16 mmtpa. RasGas (II) LNG Train 5 EPC was awarded to the consortium of Chiyoda- Snamprogetti in July 2004.



### The RasGas III project (LNG Trains 6, 7)

CTJV, Japan's **Chiyoda** and France's **Technip** Joint Venture, signed the contract for the engineering, procurement and construction of the RasGas onshore projects trains 6 and 7.



Two additional LNG trains, n°6 and n°7 have been decided and new offshore wells, the largest producing wells in the industry, have been drilled. Each train is designed to produce 7.8 million tonnes per year of liquefied natural gas, making them two of the world's largest LNG trains.



### Unidro's role in the RasGas projects

**Unidro** is a qualified supplier of the different EPC JV's members, Chiyoda Corporation, Snamprogetti S.p.A., Technip and has been invited to quote from both JV's for water treatment packages required for RasGasII and RasGasIII Projects, succeeding in securing most of them.

#### RasGas II

The first contract for two packages was awarded in December 2001, delivery was completed on schedule and the units have been successfully installed, commissioned, started-up and are now in operation.

When the contract for Train 5th train was released to the EPC JV, Unidro has been awarded an additional order for an expansion of the units. Delivery of this expansion has been completed (2004) and start-up duly performed during Q4 2005.



Softening for boiler feed water treatment:  
n° 2 softening units by ion exchange resin  
complete with system for regeneration  
capacity of each unit 23 m3/h



Filtration of waste water for reinjection :  
n° 2+1 multilayer filters, n° 2+1 cartridge filters,  
backwash system.  
capacity of each unit 40 m3/h

#### RasGas III

In early 2006 Unidro has been awarded all water treatment packages for Rasgas III project, which include:

Water Polishing Unit

Waste Water Filters for reinjection

Remineralisation of desalinated water for potable use

Sour gas Caustic scrubber

A dedicated Task Force has been set-up and a special coordination procedure established in order to assure the required design harmonisation for all the packages and, at the same time, to keep the pace of an overall design and delivery schedule which is a crucial issue of the project

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## Dolphin Project

Dolphin Energy's Dolphin Gas Project is the largest single energy initiative ever undertaken in the Middle East.

Once the plan is fully implemented in 2006, Dolphin Energy will produce natural gas from Qatar's offshore North Gas Field and process it onshore at Ras Laffan Industrial City to extract Condensate and NGL products. The resulting export gas will subsequently be transported by the Dolphin pipe-line to the UAE. The project will reach full capacity within two years of production beginning

The shareholders of Dolphin Energy Limited, include Mudabala Development Company, fully owned by the Government of Abu Dhabi, Total of France and Occidental Petroleum of the USA.

JGC Corporation of Japan won early 2004 the EPC contract from Dolphin Energy to build the gas processing plant at Ras Laffan.



## Unidro's role in the Dolphin project

Unidro has been awarded by JGC Corporation a contract to supply two separate units based on special resins application to purify process streams.

The contract, awarded on October 2004 and delivered in Q3 2005, is scheduled for start-up during 2006.

The units have been completely preassembled at shop prior to shipment (see photos).

